

HR-343 Non-Corrosive Tie Reinforcing and Dowel Bars for Highway Pavement Slabs

Abstract

The use of non-metallic load transfer and reinforcement devices for concrete highway pavements is a possible alternative to avoid corrosion problems related to the current practice of steel materials. Laboratory and field testing of composite materials, and fiber composite tie rods were carried out in this research investigation.

Fatigue, static, and dynamic testing was performed on full-scale concrete pavement slabs which were supported by a simulated subgrade and which included a single transverse joint. The behavior of the full-scale specimens with both steel and fiber composite dowels placed in the test joints was monitored during several million load cycles which simulated truck traffic at a transverse joint.

Static bond test were conducted on fiber composite tie rods to determine the required embedment length. These tests took the form of bending tests which included curvature and shear in the embedment zone and pullout tests which subjected the test specimen to axial tension only.

Fiber composite dowel bars were placed at two transverse joints during construction of a new concrete highway pavement in order to evaluate their performance under actual field conditions. Fiber composite tie rods were also placed in the longitudinal joint between the two fiber composite doweled transverse joints.